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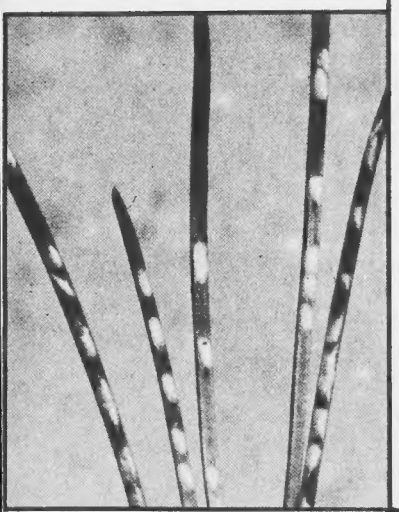
by L. O. T. PETERSON



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THE CONTROL OF THE PINE NEEDLE SCALE IN THE PRAIRIE PROVINCES

by

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INTRODUCTION

In the Prairie Provinces the pine needle scale* is primarily a pest of spruce, but it will also attack pine, fir, and hemlock. It never occurs in serious numbers in the natural forests but is often very abundant on spruce in nurseries and farm shelter belts and on spruce grown for shade or ornamental purposes in urban centers and about farm homes. The pine needle scale can kill trees, but in most cases it simply reduces their vigor gradually until they fall prey to borers and bark beetles or are unable to withstand adverse weather conditions. This pest is steadily becoming more widespread in the agricultural areas of the Prairie Provinces. The distribution of nursery stock infested with pine needle scale establishes it in new places; winds, and probably other agencies, spread the newly hatched young from tree to tree.

RECOGNITION OF THE INSECT AND NATURE OF INJURY

The occurrence of small, white scales on the needles is a good indication that trees are infested with the pine needle scale. Since these scales may persist on the needles for two or three years after the insects are dead, they often become very numerous on the trees.

The insects cause injury by piercing the needles with their long, bristle-like mouth parts and sucking out the cell sap. Extraction of the sap injures the cells, and a yellowish green area develops around each insect. In severe infestations, with 20 or more insects per needle, the entire foliage of the tree, except the current year's growth, assumes a dull, unhealthy appearance; the growth of the tree is noticeably checked and needle-drop is very heavy.

SEASONAL HISTORY, HABITS, AND DESCRIPTION

There is only one generation of the pine needle scale each year in the Prairie Provinces.

The insect overwinters in the egg stage underneath the scale covering, which is secreted by the female before the commencement of egg-laying. The number of eggs laid by one female, and therefore the number occuring under a single scale, varies from zero to almost 90. Averages may range from less than 20 to more than 50 eggs per female, depending on the age of the infestation and the numbers of females present on the needles. The eggs are minute, oval in shape, and reddish with purplish reflections. Hatching is greatly influenced by the spring weather conditions. Hot, dry weather in May stimulates early and rapid hatching, but cool, wet weather delays incubation and prolongs the hatching period. Commencement of hatching at Indian Head, Sask., recorded yearly for 15 years, varied from May 26 to June 27. The average date for this period was June 6. The hatching period may vary from 6 to 14 days, depending on weather conditions.

* *Phenacaspis pinifoliae* (Fitch).

The newly hatched young, or first-stage nymphs, are minute, reddish pink, oval insects. They are active, and most of them crawl out from under the scale covering and disperse over the needles. When they find suitable feeding sites they become stationary, with their mouth parts thrust into the needle tissues. The mouth parts of the female remain inserted throughout the life of the insect; those of the male, only until the end of the nymphal stage. Shortly after the nymphs become stationary they flatten out and become light brown. The first molt takes place about two weeks after hatching, giving rise to the second-stage nymphs. In this stage, legs, antennae, and eyes are degenerate. It is after this molt that the females may first be readily distinguished from the males.

Approximately three weeks after the first molt, the second-stage female molts again, to enter the adult stage. She remains flattened and degenerate and still lacks the white scale covering. The male, however, in the three-week interval following the first molt, secretes a scale covering and develops from a degenerate form to a tiny, winged insect capable of flight and very different from the sedentary female adult.

Secretion of the scale covering by the female begins soon after the second molt and is completed about mid-August. The scale is oval, white, smooth, and approximately 1/10 inch long, with two dark cast skins attached to its narrow end. In comparison, the scale covering of the male is elongate, and approximately 1/20 inch long, with faint longitudinal ridges and with one cast skin attached to its narrow end. Both males and females form the scale covering by exuding wax from glands on the posterior end of the body.

Egg-laying begins about mid-August and unless cold weather sets in may continue until late October. As egg-laying progresses, the body of the female shrinks and the eggs fill up the resulting cavity beneath the scale covering, where they remain until hatching takes place the following spring.

CONTROL

The natural factors that assist in controlling the pine needle scale are climate, predators, and parasites. Extreme heat and heavy rains soon after hatching has occurred destroy many of the insects. The larvae and adults of ladybird beetles feed on all stages of this scale; in old infestations these predators may become numerous. Parasites also destroy some females.

In spite of the effectiveness of natural agencies in reducing populations of the pine needle scale, serious injury to the trees often occurs if artificial control measures are not employed. Spraying with an effective insecticide at the right time is the best remedy. Malathion has proved to be the most suitable of the many insecticides tested. Two applications of it during the season are recommended. The first one, for control of the newly hatched nymphs, should be made about June 6; if the season is unusually early, about June 1, or if the season is late, about June 15. The second application should be made during the second week in August. It is directed against surviving females before they commence laying eggs. Both treatments should be thorough enough to wet all foliage without drenching the trees.

Malathion, for use on plants, is available as a 50 per cent emulsifiable concentrate and as a 25 per cent wettable powder. Both preparations are effective against the pine needle scale. The recommended rate is 1 3/5 pints of Malathion 50 per cent emulsifiable concentrate or 4 pounds of Malathion 25 per cent wettable powder, to 40 gallons of water. If the wettable powder preparation is used it is necessary that the sprayer be provided with some mechanical device for keeping the spray mixture agitated during the treatment. Approximately 2 gallons

of prepared spray is required for a spruce tree 15 feet to 20 feet in height; for trees in compact rows or groups less spray may be needed; for widely separated trees on lawns, on boulevards, and in parks more than 2 gallons may be required to obtain good coverage.

Malathion is poisonous. The precautions given on the container by the manufacturer should be observed in handling it.

For further information on the control of the pine needle scale write to the Forest Nursery Station, Indian Head, Sask. Additional copies of this publication may be obtained from this Station or from:

Information Division,
Department of Agriculture,
Ottawa, Ontario,
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